NOTE XII.

THE RECENT CRINOIDS OF THE LEYDEN MUSEUM

BY

AUSTIN H. CLARK.

During the past summer I visited the Leyden Museum for the purpose of examining the types of certain crinoid species which are preserved in that institution. Most of these species were originally described by Dr. P. Herbert Carpenter in 1881 (Notes from the Leyden Museum, vol. 3, pp. 171—217), but a few were instituted forty years previously by Professor Johannes Müller (Monatsber. d. k. preuss. Akad. d. Wiss., Berlin, 1841, pp. 179—189).

As was to have been expected the discovery of many new forms and the greater knowledge thereby gained of the specific interrelationships within the group had made it necessary to review the material studied by Müller and Carpenter in order to determine more exactly, in the light of recently acquired information, just what they had at hand.

The collection of the Leyden Museum has already been discussed in these pages, Carpenter in 1881 having given an extended account of it, including redescriptions of all of Müller's types. The present notes are offered as a supplement to those previously published by Carpenter, while at the same time the opportunity is taken of recording such specimens as have been received since his visit.

I wish to offer my best thanks to Dr. F. A. Jentink and to Dr. R. Horst for their kindness in permitting me

to study the valuable and historic collection under their care, and for the many courtesies which they extended to me during my visit to Leyden.

THE TYPES IN THE LEYDEN MUSEUM.

The types of the following species described by Johannes Müller in 1841 are in the Leyden Museum:

Alecto novæ-guineæ.	*Alecto timorensis.*
Alecto bennetti.	*Alecto flagellata.*
Alecto japonica.	*Alecto elongata.*

The types of the following species described by P. Herbert Carpenter in 1881 are in the Leyden Museum:

Actinometra alternans.	*Antedon bimaculata.*
Actinometra schlegelii.	*Antedon brevicuneata.*
Actinometra robustipinna.	*Antedon laevicirra.*
Antedon pinniformis.	*Antedon perspinosa.*
Antedon spicata.	*Antedon serripinna.*

At the present time these species are all referred to different genera from those in which they were described, as follows:

Alecto novæ-guineæ:	*Comaster novæ-guineæ.*
Alecto bennetti:	*Comanthus bennetti.*
Alecto japonica:	*Comanthus japonica.*
Alecto timorensis:	*Comanthus parvicirra.*
Alecto flagellata:	*Dichrometra flagellata.*
Alecto elongata:	*Dichrometra flagellata.*
Actinometra alternans:	*Comantheria alternans.*
Actinometra schlegelii:	*Comanthina schlegelii.*
Actinometra robustipinna:	*Himerometra* sp.
Antedon pinniformis:	*Amphimetra pinniformis.*
Antedon spicata:	*Stephanometra spicata.*
Antedon bimaculata:	*Dichrometra bimaculata.*
Antedon brevicuneata:	*Dichrometra protectus.*
Antedon laevicirra:	*Dichrometra protectus.*
Antedon perspinosa:	*Colobometra perspinosa.*
Antedon serripinna:	*Oligometra serripinna.*

ANNOTATED LIST OF SPECIES.

Comatella maculata (P. H. Carpenter).

Actinometra maculata 1888. P. H. CARPENTER, »Challenger" Reports, vol. 26, Zoology, p. 307, pl. V, figs. 1 *a-d*; pl. LV, fig. 2.

Comatella maculata 1911. A. H. CLARK, Proc. U. S. Nat. Mus., vol. 39, p. 680.

West Java (J. F. van Bemmelen, 1894). — One small specimen.

Capillaster multiradiata (Linné).

Asterias pectinata (part.) 1758. LINNÉ, Syst. Nat., ed. X, p. 663 (reference to Petiver).

Asterias multiradiata 1758. LINNÉ, Syst. Nat., ed. X, p. 663 (type specimen, but not references cited).

Capillaster multiradiata 1909. A. H. CLARK, Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 134.

Java Sea (J. Scherpbier Azn., 1896). — One specimen.

Comatula pectinata (Linné).

Asterias pectinata 1758. LINNÉ, Syst. Nat., ed. X, p. 663 (type specimen, but not references cited).

Comatula cumingii 1849. J. MÜLLER, Abhandl. d. k. preuss. Akad. d. Wiss., Berlin, 1847, p. 255.

Comatula pectinata 1908. A. H. CLARK, Proc. U. S. Nat. Mus., vol. 33, p. 685.

No locality. — One typical specimen of the broad armed type.

Comaster typica (Lovén).

Phanogenia typica 1866. LOVÉN, Öfversigt k. Vetensk.-Akad. Forhandl., 1866, N° 9, p. 231.

Comaster typica 1909. A. H. CLARK, Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 139.

Jobi (von Rosenberg). — This specimen has already been described in detail by Carpenter. It resembles very closely the specimen from Fiji in the Copenhagen Museum which I have described, and which was mentioned by Carpenter in the »Challenger" Report (vol. 26, Zoology, p. 298). There are from four to six post-radial axillaries; four of the IIBr series are 2, and six are 4 (3 + 4).

Comaster novæ-guineæ (J. Müller).

Alecto novæ-guineæ 1841. J. Müller, Archiv für Naturgeschichte, 1841, I, p. 146.
Comaster novæ-guineæ 1908. A. H. Clark, Proc. U. S. Nat. Mus., vol. 33, p. 686.

Eidouma: New Guinea (Salomon Müller). — There are fifteen cirrus-sockets and one segment of a single cirrus remaining. The specimen has the same smooth appearance as the specimen of Lütken's *Actinometra stellata* (*i. e.*, *Comaster typica*) from Fiji in the Copenhagen Museum. Compared with the specimen of *C. typica* at hand (see p. 177; also vol. 3, p. 195) the only differences to be found are the lesser number of arms and the thinly discoidal centrodorsal, on which are cirrus-sockets. It almost entirely lacks the rough and spinous characters presented by the Philippine specimens recorded by myself as *novæ-guineæ* (Smiths. Miscell. Coll., Quarterly Issue, vol. 52, part 2, p. 204, *Phanogenia novæ-guineæ*) and may very possibly turn out to be after all synonymous with *typica*.

Comantheria alternans (P. H. Carpenter).

Actinometra alternans 1881. P. H. Carpenter, Notes from the Leyden Museum, vol. 3, p. 208.

No locality. — This specimen has about ninety arms; the division series are regularly alternating, the IIBr series being 4 (3 + 4), the IIIBr series 2, the IVBr series 4 (3 + 4),

the VBr series 2, etc.; there are almost no exceptions to this regular alternation. The centrodorsal is in shape like an *Hippasteria phrygiana*, not yet having become stellate.

Comanthina schlegelii (P. H. Carpenter).

Actinometra schlegelii 1881. P. H. Carpenter, Notes from the Leyden Museum, vol. 3, p. 210.

Actinometra dissimilis 1884. P. H. Carpenter »Challenger" Reports, vol. 11, Zoology, p. 110.

Actinometra duplex 1888. P. H. Carpenter, »Challenger" Reports, vol. 26, Zoology, p. 335, pl. LXIV, fig. 3.

Actinometra nobilis 1888. P. H. Carpenter, *idem*, p. 336, pl. LXV.

Actinometra regalis 1888. P. H. Carpenter, *idem*, p. 347, pl. LXVIII. — 1891. Hartlaub, Nova Acta Acad. German., vol. 58, N°. 1, p. 99.

Comanthus (*Comanthina*) *nobilis* 1909. A. H. Clark, Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 143.

?East Indies. — The type of Carpenter's *Actinometra schlegelii* proves to be a typical specimen of the species described in the »Challenger" Report as *Actinometra duplex*, *Actinometra nobilis*, and *Actinometra regalis*, three nominal species the identity of which I had discovered during a visit to the British Museum just before coming to Leyden. The type specimen appears to have had four cirri of which the first two segments still remain; there are numerous more or less obsolete cirrus-sockets. This is a common condition in this species; specimens are found with no cirri at all and with the centrodorsal very small and stellate, or there may be as many as a dozen; usually there are from one to four or five. Of the IIIBr series those on two rays are typical, 2 externally, 4 (3 + 4) internally; on a third ray one of the external series is 2, but the other three series are 4 (3 + 4); on the remaining two rays all the series are 4 (3 + 4). The other division series

are 4 (3 + 4) as usual. This specimen can be easily matched with numerous others from various localities in the East Indies which I have examined.

At the time of Carpenter's visit to Leyden he had not discovered the significance of the curious variation in the number of the elements of the IIIBr series, and hence from his notes could not see that his *schlegelii* was the same thing as the *nobilis* of the »Challenger" Report. It is strange that he should have overlooked this peculiarity of structure in describing *regalis*, the more so as it is well shown in the figure of that supposed species.

There is another specimen of this species in the Leyden Museum which was collected by Dr. J. Brock at Amboina; it has already been, together with other specimens of the same species, recorded by Hartlaub under the name of *Actinometra regalis*.

Comanthus bennetti (J. Müller).

Comatula multiradiata 1832. GOLDFUSS, Petrefacta Germaniæ, vol. 1, p. 202, pl. LXI, figs. 2 *a-s*.

Alecto bennetti 1841. J. MÜLLER, Monatsber. d. k. preuss. Akad. d. Wiss., Berlin, 1841, p. 187.

Actinometra brachymera 1877. LÜTKEN, Mus. Godeffr. Cat., vol. 5, p. 100.

Actinometra peronii 1881. P. H. CARPENTER, Notes from the Leyden Museum, vol. 3, p. 214.

Comanthus (*Comanthus*) *bennetti* 1909. A. H. CLARK, Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 147.

No locality. — Two typical specimens.

Ceram (coll. Hoedt). — This is the type of Carpenter's *Actinometra peronii*; it does not differ from true *bennetti*.

Comanthus japonica (J. Müller).

Alecto japonica 1841. J. MÜLLER, Archiv für Naturgeschichte, 1841, I, p. 145.

Japan (von Siebold). — The numerous cirri are rather strongly curved distally; the dorsal pole of the centrodorsal is very broad; the rays and division series are rather broad, and the axillaries are long and acutely pointed, suggesting the conditions found in *C. trichoptera*.

Comanthus parvicirra (J. Müller).

Alecto parvicirra 1841. J. MÜLLER, Archiv für Naturgeschichte, 1841, I, p. 145.
Alecto timorensis 1841. J. MÜLLER, *idem*, p. 145.
Comanthus (*Comanthus*) *parvicirra* 1911. A. H. CLARK, Proc. U. S. Nat. Mus., vol. 39, p. 536.
For a complete synonymy of this species see Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 144, omitting *Comatula rotalaria* Lamarck, 1816 (= *Comatula rotalaria*), and *Alecto wahlbergii* J. Müller, 1843 (= *Comanthus wahlbergii*).

Indian Ocean (Bennet). — One specimen with thirty-three arms.

Ceram (coll. Hoedt). — One small specimen with nineteen arms and no functional cirri.

Timor (types of *Alecto timorensis*). — These specimens can be matched exactly with others which I have examined collected in the Philippine Islands; the cirri are VI, XIII, and XIV, 13—14.

Solor Islands (coll. Semmelink). — Two specimens, one small with twenty arms and cirri X, the other medium sized with twenty-four arms and cirri IX. The cirri, as in the preceding from Timor, are comparatively well developed, and show an approach to the type found in *Comanthus samoana*.

Amphimetra mollerl (A. H. Clark).

Antedon milberti (part.) 1891. HARTLAUB, Nova Acta Acad. German., vol. 58, N°. 1, p. 81.

Himerometra molleri (Lütken, MS.) 1908. A. H. CLARK, Proc. Biol. Soc. Washington, vol. 21, p. 222. — 1909. Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 156.

Amphimetra molleri 1909. A. H. CLARK, Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 156.

Atjeh (W. Baerts, 1887). — The cirri are XXII, 32—34 (usually the latter), bearing sharp dorsal spines from the tenth or eleventh segment onward; the synarthrial tubercles are developed as in the type of *A. pinniformis*. The size is slightly less than that of the type of *A. molleri* at Copenhagen.

Amphimetra pinniformis (P. H. Carpenter).

Antedon pinniformis 1881. P. H. CARPENTER, Notes from the Leyden Museum, vol. 3, p. 180.

Andai: New Guinea. — This is a small species of *Amphimetra*, of the *milberti*-division of the genus. The cirri are moderately stout, tapering slightly in the distal half, with all the segments subequal, about twice as broad as long, those in the proximal half slightly longer, those in the distal half slightly shorter. The synarthrial tubercles are rather prominent, though small, as in specimens of *Amphimetra discoidea* from Port Molle, Queensland. P_2 is much larger than the small and weak P_1, and is long and stout; P_3 is similar to P_2 and nearly as long and stout; the following pinnules are small and weak; the cirr are XII, 25; the dorsal spines on the outer segments are sharp and long.

Himerometra sp.

Actinometra robustipinna 1881. P. H. CARPENTER, Notes from the Leyden Museum, vol. 3, p. 201.

Moluccas (H. C. Macklot). — The type of Carpenter's *Actinometra robustipinna* proves to be a specimen of a

typical species of *Himerometra*; that is, according to Carpenter's classification it falls in the »*Savignyi*-group" of »*Antedon*", and is not an »*Actinometra*" at all! All the IIIBr series are 4 (3 + 4). The proximal pinnules are very large and stout, the tips ending bluntly after a considerable recurve. So far as they are preserved the segments are broader than long; the distal ends are not thickened or produced, though appearing slightly prominent and a trifle swollen. One P_2 with eighteen segments appears to be complete.

This appears to be the species, common at Singapore, which I have referred to as *Himerometra crassipinna* (Hartlaub), but the identification cannot be considered as certain on account of the absence of the cirri and of most of the pinnule tips.

Stephanometra oxyacantha (Hartlaub).

Antedon oxyacantha 1890. HARTLAUB, Nachr. Ges. Göttingen, Mai 1890, p. 178. — 1891. Nova Acta Acad. German., vol. 58, N°. 1, p. 55, pl. 3, figs. 35, 37.

Stephanometra oxyacantha 1909. A. H. CLARK, Proc. Biol. Soc. Washington, vol. 22, p. 10.

Amboina (J. Brock). — One specimen, originally part of Hartlaub's type material.

Stephanometra spicata (P. H. Carpenter).

Antedon spicata 1881. P. H. CARPENTER, Notes from the Leyden Museum, vol. 3, p. 190.

Stephanometra spicata 1909. A. H. CLARK, Proc. Biol. Soc. Washington, vol. 22, p. 10.

Banda Sea (coll. Semmelink, 1881). — The cirri are XXIII, 22—25, rather slender, resembling those of such species as *S. monacantha*; the longest segment is about twice as long as the median diameter; the longer proximal segments are somewhat »dice-box" shaped. The IIIBr series

are externally developed. The lateral tubercles on the rays are well developed and thick. P_2 is the largest, with sixteen or seventeen segments; P_3 is similar, but not quite so long; P_4 is much shorter than P_3, but stiff, with eleven or twelve segments; P_5 is slightly shorter than P_4 and is like the succeeding pinnules instead of stiff like the preceding, though it may be a trifle stiffer than its successors.

Dichrometra flagellata (J. Müller).

Alecto flagellata 1841. J. MÜLLER, Archiv für Naturgeschichte, 1841, I, p. 145.

Alecto elongata 1841. J. MÜLLER, *idem*, p. 146.

Dichrometra flagellata 1909. A. H. CLARK, Proc. Biol. Soc. Washington, vol. 22, p. 13.

No locality (coll. Brugmans). — The centrodorsal is rather large, with the dorsal pole concave; the cirrus-spines are very small and tubercular; the cirri are XL, 24, 25, 28 and 30. There are thirty-nine arms, the extra (IIIBr) division series being developed externally. The division series and first six or eight brachials are in close apposition, and are sharply flattened laterally. P_1 is very small and short; P_2 is large, over twice as long as P_1, of the same character as the same pinnule in *D. protectus*; the component segments are slightly longer than broad; P_3 is slightly longer and larger than P_2; P_4 is about the size of P_2; P_5 is somewhat smaller than P_4; the following pinnules are small and weak. The enlarged lower pinnules are strongly curved outward and backward; they stand out very prominently through their large size, the middle and outer pinnules being especially short.

New Guinea (coll. Salomon Müller) (type of *Alecto elongata*). — The cirri are XXIV, 25; the longest cirrus-segments are about one third longer than broad; the ninth or tenth and following bear small but prominent dorsal spines. There are about twenty very long and slender arms: six IIBr series and four IIIBr series (developed

exteriorly) are present. The synarthrial tubercles are slightly prominent, and the basal portion of the arms is rugose as in *D. protectus*. The division series are not in lateral contact, though they have tolerably straight sides; the IBr_1 are entirely united laterally, but the axillaries are free. There are no lateral processes such as are seen in *Stephanometra*. P_3 has from twenty to twenty-two segments; P_1 is small and weak; P_2 is nearly twice as long as P_1, and P_3 is still longer; P_4 is nearly as large as P_3, being intermediate between P_2 and P_3; P_5 is much shorter; the following pinnules are small and weak. The proximal pinnules resemble those of the preceding specimen, but are slightly less stiffened, and are more flexible and more flagellate distally.

There appear to be no differences between these two specimens not to be accounted for by the difference in the size of the two individuals, and there can be little doubt but that they in reality belong to the same species.

Dichrometra bimaculata (P. H. Carpenter).

Antedon bimaculata 1881. P. H. Carpenter, Notes from the Leyden Museum, vol. 3, p. 186.

Dichrometra bimaculata 1909. A. H. Clark, Proc. Biol. Soc. Washington, vol. 22, p. 13.

Amboina (coll. Ludeking). — This is a very characteristic species and was well described by Carpenter; P_2 is twice as long as P_1; P_3 is considerably longer and stouter than P_2; P_4 is about the length of P_3, but has slightly shorter segments; P_5 is considerably shorter, with only thirteen segments, but of the same character as the preceding. The lower pinnules are stiffened about as is P_2 in *D. protectus*; they are not especially enlarged, and are perfectly smooth, not being basally carinate; P_3 is quite appreciably larger and longer than either P_2 or P_4, there being considerably more difference than in the case of *D. flagellata*. The centrodorsal is large, thick discoidal,

the dorsal pole concave; the cirrus-sockets are arranged in three irregular and crowded rows. There are forty arms, all of the IIBr and IIIBr series being developed; the division series are laterally flattened. There are faint tubercles on the last ten or twelve cirrus-segments; none of the cirri remain in situ.

Dichrometra protectus (Lütken).

Antedon protectus 1874. LÜTKEN, Mus. Godeffr. Cat., vol. 5, p. 190 (*nomen nudum*). — 1879. P. H. CARPENTER, Trans. Linn. Soc. (Zool.), (2), vol. 2, p. 19.

Antedon brevicuneata 1881. P. H. CARPENTER, Notes from the Leyden Museum, vol. 3, p. 187. — 1891. HARTLAUB, Nova Acta Acad. German., vol. 58, N°. 1, p. 68, pl. 3, fig. 31; pl. 4, fig. 39.

Antedon imparipinna 1882. P. H. CARPENTER, Journ. Linn. Soc. (Zool.), vol. 16, p. 505. — 1891. HARTLAUB, Nova Acta Acad. German., vol. 58, N° 1, p. 63, pl. 4, figs. 40, 41, 43.

Dichrometra protectus 1909. A. H. CLARK, Proc. Biol. Soc. Washington, vol. 22, p. 13. — Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 172.

Amboina (coll. Ludeking). — The cirri are XXVIII, 20—23; the division series are not quite in lateral contact. There are thirty-nine arms; the division series resemble those of the type of *Antedon laevicirra*, but are composed of slightly shorter segments. P_2 is large and stout, tapering distally to a slender tip. The pinnules on the outer arms are considerably larger than those on the inner.

This specimen may be exactly matched with others from the Philippine Islands which I have examined.

Dichrometra laevicirra (P. H. Carpenter).

Antedon laevicirra 1881. P. H. CARPENTER, Notes from the Leyden Museum, vol. 3, p. 189.

Aru Islands (von Rosenberg). — The dorsal pole of the centrodorsal is flat and rather broad. The cirri are XXII, 24—28. There are thirty-seven arms; the division series are entirely free laterally, though close together. The eighth to eleventh cirrus-segments are very slightly longer than broad; the last ten or twelve are rather sharply carinate, in dorsal view showing a dorso-ventrally elongate tubercle. The proximal pinnules resemble those of the slender pinnuled varieties of *D. protectus*; the second and third segments of the lower pinnules are slightly carinate.

The division series of this species resemble those of *D. protectus*; in fact the whole animal is so much like the slender pinnuled form of *D. protectus* that I should not be surprised if they eventually proved to be identical. The earlier pinnules on the outer side of the outer arms are considerably larger than the others.

Dichrometra palmata (J. Müller).

Alecto palmata 1841. J. Müller, Archiv für Naturgeschichte, 1841, I, p. 144.

Dichrometra palmata 1909. A. H. Clark, Proc. Biol. Soc. Washington, vol. 22, p. 13.

For a detailed synonymy of this species see Proc. U. S. Nat. Mus., vol. 39, p. 691.

Djeddah (J. A. Kruyt). — The cirri are lost. There are twenty-seven arms. P_2 has twenty-five segments, and is twice as long and large as P_1, smooth, the segments becoming squarish on the fourth, then slightly longer than broad, and terminally twice as long as broad. P_3 is considerably smaller than P_2, being basally only about as large as P_1; the division series are widely separated, and the lateral edges of the segments are tending to round out laterally into lateral processes, as is the case in some specimens of. *D. protectus*.

Colobometra perspinosa (P. H. Carpenter).

Antedon perspinosa 1881. P. H. Carpenter, Notes from the Leyden Museum, vol. 3, p. 178. — 1891. Hartlaub, Nova Acta Acad. German., vol. 58, N°. 1, p. 85 (reference to the Leyden specimen and to *Antedon loveni* only).

Colobometra perspinosa 1909. A. H. Clark, Proc. Biol. Soc. Washington, vol. 22, p. 6.

Jobi (von Rosenberg). — The cirri are XIII, 53, 55, 56, 57, 58 and 59, long and comparatively slender, tapering slightly in the distal half; the longer proximal segments are slightly (about one third) longer than broad. P_a is absent; the IBr_1 are short, three times as broad as long; the IBr_2 are also short, twice as broad as long. The synarthrial tubercles are small, but well marked, with the proximal half (on the IBr_1) more or less spinous. P_1 is slightly stiffened, about as two thirds the length of P_2, with about fifteen segments which become squarish on the third and distally three times as long as broad. P_2 is enlarged and greatly stiffened; P_3 is slightly larger than P_2, but similar to it. The following pinnules to P_6 or P_8 are similar, but slowly decrease in length and thickness; those following are only slightly stiffened. The distal pinnules are very long and slender, with about twenty-seven segments.

The proximal pinnules are comparatively slender, not so stout as those of *C. vepretum*; the cirri are also slightly less stout than are those of that species. P_1 is rather strongly prismatic, and the following pinnules are prismatic for a diminishing distance basally.

Amboina (coll. Ludeking). — The cirri are XII, 56—65, exactly like those of the preceding. The whole animal exactly resembles the type.

The stiffness of P_1, which is composed of elongated

segments, appears to separate this form sharply from *C. vepretum*, and to place it in the *diadema*-group of species.

Oligometra serripinna (P. H. Carpenter).

Antedon serripinna 1881. P. H. Carpenter, Notes from the Leyden Museum, vol. 3, p. 182.
Oligometra serripinna 1908. A. H. Clark, Proc. Biol. Soc. Washington, vol. 21, p. 126. — 1909. Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 179.
Oligometra pulchella 1908. A. H. Clark, Proc. Biol. Soc. Washington, vol. 21, p. 226.

Andai: New Guinea. — The type specimen of this species fits closely the description of the form which I called *pulchella*; the projection of the distal ends of the lower pinnule segments is not greatly accentuated. The purple bands on the arms are very narrow.

Tropiometra sp.

Indian Ocean. — The cirri are XV, 18—22, comparatively weak and slender, as in the specimens labeled »South Pacific" in the U. S. National Museum; the cirrus-segments are all subequal, all slightly broader than long, the last four tapering slightly; the brachial carination is moderate, as in the »South Pacific" specimens.

This specimen appears to belong to an undescribed species which occurs westward from the Indian Ocean to the South Sea Islands; it is characterized by having the cirri small and weak, though otherwise as in *T. picta* of the West Indies and Brazil. The cirri of the two other Indian Ocean species, *T. carinata* and *T. encrinus*, are stout and large, especially in the first named, which has the largest cirri of any of the smaller species of the genus; the cirri of *T. carinata* are easily distinguished by their very short segments. I have not as yet been able to examine a sufficient number of specimens of this animal to

justify me in bestowing upon it a new specific name. East Indian specimens of species of this genus appear to be very rare.

Antedon bifida (Pennant).

Decempeda cornubiensium 1699. LLHUYD, Lithophylacii Britannici Ichnographica.

Δεκάκνεμος rosacea 1733. LINCK, De Stellis marinis, p. 55, pl. XXXVII, fig. 66.

Asterias pectinata (part.) 1758. LINNÉ, Syst. Nat., Ed. X, I, p. 663.

Asterias bifida 1777. PENNANT, British Zoology, vol. 4, p. 65, N°. 70.

Asterias decacnemus 1777. PENNANT, *Tom. cit.*, p. 66, N°. 71.

Antedon gorgonia 1811. DE FRÉMINVILLE, Bull. Soc. Philomatique, vol. 2, p. 349.

Alecto europæa 1815. LEACH, Zool. Miscell., vol. 2, p. 62.

Comatula fimbriata 1821. MILLER, Nat. Hist. of the Crinoidea, p. 132, and frontispiece.

Pentacrinus europæus 1827. J. V. THOMPSON, A Memoir on the Pentacrinus europæus, p. 1, pls. I, II.

Comatula barbata 1828. FLEMING, Hist. British Animals, p. 490.

Hibernula europæa 1828. FLEMING, *idem*, p. 494.

Phytocrinus europæus 1830. DE BLAINVILLE, Dict. des sciences naturelles, vol. 60, p. 236.

Ganymeda pulchella 1834. GRAY, Proc. Zool. Soc. London, 1834, part 2, p. 16.

Alecto milleri 1841. J. MÜLLER, Archiv für Naturgeschichte, 1841, I, p. 142.

Antedon decameros 1848. GRAY, Brit. Mus. Cat.; Brit. Radiata, p. 28.

Comatula brachiolata 1864. BELTRAMIEUX, Annales de l'Acad. de la Rochelle, 1864, p. 90.

Astrophyton elizabethæ 1866. MCINTOSH, Proc. Roy. Soc. Edinburgh, vol. 5, p. 609, fig. 4.

Antedon mulleri 1882. P. H. CARPENTER, Report British Association for 1881 (York), p. 672.

Antedon bifida 1889. BELL, Ann. and Mag. Nat. Hist. (6), vol. 4, p. 432.

North Atlantic Ocean. — One specimen.

Antedon mediterranea (Lamarck).

Stella marina 1592. COLUMNA, *Φυτοβάσανος*, sive Plantarum aliquot Historia, p. 109, pl. XXIX; appendix »Piscium aliquot plantarumque novarum Historia," p. 12.

Δεκάκνεμος fimbriata 1714. BARRELIER, Plantæ per Galliam, Hispaniam, et Italiam observatæ, p. 131, N°. 1282.

Δεκάκνεμος crocea 1733. LINCK, De Stellis marinis, p. 55.

Δεκάκνεμος barbata 1733. LINCK, *idem*, p. 55, pl. XXXVII, fig. 64.

Asterias pectinata (part.) 1758. LINNÉ, Syst. Nat., ed. X, p. 663.

Comatula mediterranea 1816. LAMARCK, Hist. nat. des animaux sans vertèbres, vol. 2, p. 535.

Comatula annulata 1826. RISSO, Hist. nat. des principales productions de l'Europe méridionale, vol. 5, p. 275.

Comatula coralina 1826. RISSO, *Tom. cit.*, p. 275.

Comatula bicolor 1841. DELLE CHIAJE, Descrizione e Notomia degli animali invertebrati della Scicilia citeriore, vol. 4, p. 65, pl. CLXXII, figs. 6, 7.

Comatula adeonæ 1832. DELLE CHIAJE, Instituzioni di Anatomia e Fisiologia comparativa, vol. 1, p. 205.

Antedon mediterranea 1909. A. H. CLARK, Vidensk. Medd. fra den naturhist. Forening i Kjøbenhavn, 1909, p. 120. — 1910. Proc. U. S. Nat. Mus., vol. 38, p. 330.

Mediterranean Sea (coll. Cantraine). — Three specimens.

Naples (J. G. de Man, 1876). — Seventeen specimens.

Heliometra glacialis (Leach).

Alecto glacialis 1830. (Leach), in Cat. Contents Mus. Roy. Coll. Surgeons of London, part IV, fasc. I, p. 14, N°. 85*a*.

Alecto eschrichtii 1841. J. Müller, Archiv für Naturgeschichte, 1841, I, p. 142.

Heliometra glacialis 1908. A. H. Clark, American Naturalist, vol. 42, p. 719.

Greenland. — Two specimens.

Metacrinus rotundus P. H. Carpenter.

Metacrinus rotundus 1884. P. H. Carpenter, »Challenger" Reports, Zoology, vol. 11, p. 344. — 1885. Trans. Linn. Soc. (Zool.), (2), vol. 2, p. 436, pl. L; pl. LII, figs. 1—7.

»*The 'Vega' specimen*" 1884. P. H. Carpenter, »Challenger" Reports, vol. 11, Zoology, p. 344.

Japan. — Two beautiful specimens.

Rhizocrinus lofotensis M. Sars.

Rhizocrinus lofotensis 1864. M. Sars, Forhandl. Vidensk. Selsk., 1864, p. 127.

North Atlantic Ocean. — Two specimens.

Washington, February 1911.

The following two specimens have, accidentally, not been recorded by the author.

on page 179: **Comantheria briareus** (Bell).

West Java (J. F. van Bemmelen, 1894). — One specimen.

on page 181: **Comanthus parvicirra** (J. Müller).

Atjeh (W. Baerts, 1887). — One specimen.

R. H.